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GAS ABSTRACTS

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Contents

1. Gas Industry 107
2. Appliances 108
3. Combustion and Industrial Furnaces 109
4. Carbonization and Gasification 109
5. Natural Gas and Natural Gas Condensates 110
6. Petroleum and Synthetic Liquid Fuels 111
7. Analytical Methods and Tests 112
8. General and Physical Chemistry 112
10. Chemical Engineering 113
11. Process Equipment and Instrumentation 115
12. Materials of Construction 117
13. New Books 118

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1. GAS INDUSTRY

Natural Gas Transportation

Kayser, P. NATURAL GAS TRANSPORTATION. *Pipe Line News* **20**, 9-13 (1948) *May.*

The El Paso Natural Gas Company has grown in 18 years from a 205 mile line to a 3,000 mile line including 1,000 miles of 24 and 26 inch main line. Delivery has increased from 15 MMcf/day to 450 MMcf/day while assets have increased from $6,000,000 to $106,000,000. It is stated that the cost of transporting gas 840 miles in the Texas-California line is 10¢/Mcf. The cost of transporting coal as such and in a gasified state are also given.

J. D. Parent

Pipe Requirements

Marsh, F. A. WHAT'S AHEAD IN PIPE? *Gas Age* **101**, 24, 46, 48, 50 (1948) *April* 15.

Pipe requirements for all planned gas pipe line projects have been estimated at approximately 20,992 miles, totaling 4,970,000 tons of large-diameter lines desired in the next five years. Preliminary figures set the 1947 production of tubular goods at 6,117,000 tons which may be raised to about 6,400,000 tons when final year-end reports are collected, some 22-28% above tubular production in 1946. The 1947 figure may be roughly divided into 38% standard pipe, 12% mechanical and pressure tubing, 21% oil country goods, and 20% line pipe, with the balance going into miscellaneous products. Thus about 1,200,000 tons of line pipe were produced last year. Traditionally about one-third of the total trunk line pipe produced is used in the construction of gas lines. The Gas Industry's requirements have changed drastically in recent years: sizes over 20-in constituted only 17% of prewar demand but now represent some 72% of total gas line requirements. Expectations are that a little more pipe will be produced in 1948 than in 1947. Some new facilities are being added; the abnormal demand for some steel products, such as household appliances, seems to be easing; and the use of oxygen to increase steel production, though still in an experimental stage, offers encouraging prospects. Well over a million tons per year of trunk pipe line will be required for the next four or five years.

J. C. Lane

Texas Natural Gas

Thompson, E. O. TEXAS NATURAL GAS—RESERVOIRS AND YEARLY PRODUCTION FROM 1939-1947. ITS FIELDS, RECOVERABLE RESERVES AND NEW TRANSMISSION LINES. *Am. Gas J.* **168**, 13-17 (1948) *May.*

The authors point out the following interesting facts. Pipe lines paid 4¼¢ per Mcf at a base pressure of 16.4 psia in Texas during 1947. Total production that year was 2,241,697,304 Mcf of which 21.62% went to pipe lines and large amounts were sent to injection wells of cycling plants. Texas formerly limited consumption of natural gas for carbon black to sour gas with a top limit of 750,000 Mcf of Panhandle gas. Now a statute has been passed which permits manufacture of carbon black from any type of gas as long as the purchase price is not less than that paid by pipe line companies.

J. D. Parent

2. APPLIANCES

Floor Panel Heating

Algren, A. B. GROUND TEMPERATURE DISTRIBUTION WITH A FLOOR PANEL HEATING SYSTEM. *Heating, Piping, Air Conditioning* **20**, 111-120 (1948) *May.*

Heat losses through floor slabs together with perimeter losses are of major importance in floor panel heating of basementless houses. Ground temperature data reported were obtained from a field test on a research residence under actual operating conditions and indicate that floor panels on the ground should include materials of insulating value.

Author's summary

Gas Pilot Burners

RESEARCH IN DESIGN METHODS OF PREVENTING CLOSURE OF GAS PILOT BURNER PRIMARY AIR OPENINGS BY DUST AND LINT. *Am. Gas Assoc. Testing Laboratories Research Bull.* **46**, 1-25 (1947) *December.*

Variations in size and position of primary air openings, burner tube diameter, shields and other protective devices are discussed relative to the design of a satisfactory blue flame pilot burner for resisting stoppage due to dust and lint suspended in the atmosphere. All results reported are based upon studies made with natural gas in experimental test chambers. A recently developed incinerator-type pilot burner was constructed and its performance is compared with that of conventional pilot burners. Pilot burners drawing all of their primary air from the main burner head or main burner venturi are also discussed as a possible solution to the problem.

Editor's abstract

Gas Appliances

Nugent, F. J. GAS HAS GOT IT—GOING AND COMING. *Am. Gas J.* **168**, 39-40 (1948) *May.*

While the present wide acceptance of gas heat for homes is gratifying, the Gas Industry "cannot afford to operate on the theory that the public now stands perpetually ready to take gas and gas appliances off our hands in unlimited volumes whenever we let them know that supplies are available." Competition between gas and electric interests for range, refrigerator, and water heater sales is becoming keener year by year. In 1947, 1,170,274 gas ranges of the oven heat control type were sold, 9% fewer than in 1941, while some 1,200,000 electric ranges were marketed, 65% more than in 1941. While 1,800,000 gas water heaters were being sold last year, 1,100,000 electric water heaters were also being sold. The Gas Industry must have, and aggressively promote, an automatic range. Whether the automatic ignition on such ranges is supplied by constant burning pilot lights, a single point flash tube, or electricity is of secondary importance so long as the ranges are automatic.

J. C. Lane

The following article, which has not been abstracted, is called to your attention:

Herr, F. A. NEW DEVELOPMENT IN GAS RANGE VENTING WITH MECHANICAL DRAFT HOOD. *Am. Gas J.* **168**, 50-52, 66 (1948) *May.*

3. COMBUSTION AND INDUSTRIAL FURNACES

Gas in Metal Processing

Harris, F. E. FURNACES AND FUELS FOR HEAT PROCESSING METALS. *Steel* 122, 90-94 (1948) *May* 10.

A discussion of the industrial application of gas to metal processing is given. Methods for determining the charge rate of hearth furnaces are discussed. It is pointed out that a gas of constant chemical composition is needed where controlled atmospheres are employed.

E. F. Davis

4. CARBONIZATION AND GASIFICATION

Catalytic Reforming of Hydrocarbons

Riesz, C. H., Lurie, P. C. and First, J. J. CATALYTIC REFORMING OF HYDROCARBONS. *Am. Gas Assoc. Monthly* 30, 17-20 (1948) *April.*

A program of catalytic cracking of hydrocarbon materials has been extended in pilot plant tests at Chester to include natural gas, propane, commercial butane and refinery oil gas in addition to refinery propane reported previously (*Gas Abstracts* 4, 48 (1948) *March*). Besides flexibility in selecting gaseous feed stocks, several commercially available catalysts were found satisfactory as gasification catalysts. Since results with commercial butane were considerably improved over previous data reported on refinery propane, it appears that this material might find application in peak load gas generating plants because of lower storage costs. The work is part of the research program sponsored by the American Gas Association Production Research Committe being carried out by the Institute of Gas Technology (Project CPR-IC).

C. H. Riesz

Manufactured Gas

52nd REPORT OF JOINT RESEARCH COMMITTEE OF THE GAS RESEARCH BOARD AND THE UNIVERSITY OF LEEDS. *Gas Research Board* (British) *Communication GRB*-34 (1947) *October* 15.

It has become desirable to standardize the send out gas manufactured in England with mutual benefits to appliance manufacturers and utilities. This report is the result of an extended survey to determine the difference in physical, chemical and combustion characteristics of gases made throughout the country and to examine effect of process and raw material used. Some of the factors considered were chemical composition, calorific value, specific gravity, Wobbe index, viscosity, theoretical air requirements, CO_2 and H_2O production on combustion, aerated test burner number, rat-tail burner, flat flame burner and the combustion diagram. Some of the causes of the variations considered: type of gas making plant, its age, condition and method of operation; type of coal carbonized; calorific value of send out gas and method of achieving it; effect of benzole extraction; use of carburetted water gas, either intermittently or as part of the base load.

E. F. Davis

5. NATURAL GAS AND NATURAL GAS CONDENSATES

California Natural Gas

Parks, E. K. PRODUCTION AND DISPOSITION OF NATURAL GAS BY CALIFORNIA PRODUCERS. *Petroleum Engr.* 19, 58, 63-64, 66, 70, 72, 74, 76 (1948) *April.*

This article covers definition of terms and current California production practice and exploration.

J. D. Parent

Natural Gas for Peak Load

Kruger, R. E. USE OF NATURAL GAS TO INCREASE MANUFACTURED GAS PLANT CAPACITY. *Am. Gas J.* 168, 27, 29-31 (1948) *May.*

This discussion is given to the problems encountered in employing natural gas to increase the capacity of manufactured gas plants at Rochester. It was found that a modified mixture of blue gas (of 230 Btu or higher) and natural gas were perfectly interchangeable with coal gas (540 Btu) as produced in Rochester. A 364 Btu mixture of producer and coke oven gas when mixed with natural gas to 540 Btu was very nearly interchangeable with the normal 540 Btu send-out.

E. F. Davis

Nitrogen Removal

Deschner, W. W. and Bodle, W. W. NITROGEN REMOVAL FROM NATURAL GAS. PART I. *Oil Gas J.* 46, 76-79, 115 (1948) *April* 15; PART II. *ibid.* 92, 94-95, 97-98, 112 (1948) *April* 22.

Data are presented indicating an approximate average nitrogen content of 7.9% for a good portion of our proved natural gas reserves. In order to avoid reduction in pipe line capacity due to inert nitrogen, removal of this constituent at or near the source is becoming of increasing importance. The most generally used method is fractional distillation at low temperatures. Flow sheets, descriptions and discussion are presented for various applicable refrigeration cycles including the Bureau of Mines Helium Separation Cycle, and the Claude and Linde cycles. Very little experimental vapor-liquid equilibrium data are available for the nitrogen-methane system. A temperature composition diagram for the system at 100 psia, calculated from fugacities, is presented for comparison with some experimental data from the literature. Three processes for removing nitrogen by low temperature liquefaction and separation are presented in detail with typical material balances, heat balances and power requirements.

W. K. Zahray

Transmission

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS. *Gas Age* 101, 42-47 (1948) *April* 29.

A discussion of factors affecting the adiabatic efficiency of piston compressors is presented.

J. D. Parent

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Catalytic Decomposition of Carbon Monoxide

Leidheiser, H., Jr. and Gwathmey, A. T. THE SELECTIVE DECOMPOSITION OF CARBON ON THE (111) FACE OF A NICKEL CRYSTAL IN THE CATALYTIC DECOMPOSITION OF CARBON MONOXIDE. *J. Am. Chem. Soc.* **70**, 1206 (1948) *April* 16.

A crystal of nickel, heated in an atmosphere of carbon monoxide at 1022°F, deposited carbon selectively on the 111 face. Similar results were noted when the carbon monoxide was diluted with hydrogen. Application of the technique to Fischer-Tropsch catalysts is suggested.

C. H. Riesz

Oil from Shale

Brown, H. D. PROCESS FOR THE RECOVERY OF OIL FROM SHALES. *U.S.* 2,431,677 (1947) *December* 2, 1947.

Broadly speaking, this patent claims a continuous method of obtaining shale oil from oil shale by reducing the shale to a particle size such that it can be mixed with recycled shale oil product to form a pumpable mixture, pumping this mixture through a preheater to one or more digesting cells, heating it therein, with agitation, to such a temperature that the shale "kerogen" is converted to hydrocarbon liquids and gases, and separating the products. Claim 1 does not specify the use of a catalyst, but Claim 2 specifies aluminum chloride addition to the mixture of shale and oil product in the mixing chamber. According to the descriptive portion of the patent, the shale is reduced to about ten-mesh size and the quantity of aluminum chloride used should not exceed three per cent by weight of the shale charge. The shale-oil-aluminum chloride mixture is heated to not more than 480°F in the preheater and is discharged into digesting cells in which it is subjected to heating at 390°F or less for sufficient time to cause conversion of the "kerogen" content to hydrocarbons. Mechanical agitation is provided in the digestion cells to maintain the solid-in-oil suspension. Features of the process are discribed as: (1) "exfoliation of the grain size along the plane of original lamination" in the digesting cells, thereby reducing the shale to a very fine carbonaceous residue; (2) a closed circuit for the catalyst, in which hydrocarbon-aluminum chloride slurry is recycled so that the aluminum chloride make-up is "exceedingly small"; and (3) recovery of very finely divided shale for use as a soil conditioner and fertilizer or as an adsorbent in refining operations. No details are given as to fixed gas-liquid product ratios in the products, and no examples of yields are presented.

J. C. Lane

Oxidation of Hydrocarbons

Bludworth, J. E. INDUSTRIAL OXIDATION OF LOWER ALIPHATIC HYDROCARBONS. *Oil Gas J.* **46**, 102-103 (1948) *April* 22.

The similarity between cracking and oxidation of hydrocarbons is discussed. Careful control of temperature is necessary to obtain substantial yields of oxygenated products.

C. H. Riesz

Synthesis Gas from Anthracite Silt

SYNTHESIS GAS FROM ANTHRACITE SILT. *Combustion* **19**, 53 (1948) *April.*

A pilot plant for the fluidized-bed gasification of anthracite silt reportedly is under construction by the Anthracite Institute at Wilkes-Barre, Pennsylvania. Silt, air and steam are fed into a refractory-lined cylinder, the silt being suspended in the gas as a fluidized bed. As combustion proceeds, the heavier ash settles to the bottom and is removed by a rotary grate. The carbon in the silt reacts with the air and steam to form a gas containing carbon dioxide, carbon monoxide, hydrogen, and nitrogen. Passage of the gas thru a second bed of silt causes conversion of the carbon dioxide to additional carbon monoxide. Steam may be introduced at the top of the fluidized bed to yield a gas of higher heating value. In addition to use as synthesis gas for the Synthine (Fischer-Tropsch) process, the gas might also be utilized as colliery fuel, thus releasing the larger sizes of anthracite for sale. It is estimated that there are about 200 million tons of anthracite silt now above ground, and some 5 million tons are produced annually by the industry.

J. C. Lane

Thermofor Catalytic Cracking

Bednars, C., Luntz, D. M. and Bland, R. E. A STUDY OF OPERATING VARIABLES IN THERMOFOR CATALYTIC CRACKING. *Chem. Eng. Progress* **44**, 293-298 (1948) *April.*

The effects of space velocity, reaction temperature, and catalyst activity on product distribution are presented graphically. The results are considered principally from the point of view of yield and quality of gasoline produced. The yield of butane free gas varies from 4 to 8 wt % of oil charged.

W. J. Merwin

7. ANALYTICAL METHODS AND TESTS

Free Radical Detection

Eltenton, G. C. THE MASS-SPECTROMETRIC DETECTION OF FREE RADICALS. *J. Phys. Colloid Chem.* **52**, 463-469 (1948) *March.*

An experimental procedure is described in which a mass spectrometer is coupled with a reactor for the detection of intermediates formed during the reaction. The application of the apparatus to the study of intermediates formed in the thermal cracking of hydrocarbons and to the study of flames is described.

S. Katz

8. GENERAL AND PHYSICAL CHEMISTRY

Alkylbenzenes

Francis, A. W. PROPERTIES OF ALKYLBENZENES. *Chem. Revs.* **42**, 107-163 (1948) *February.*

Physical properties of the 379 known alkyl-

benzenes are tabulated. These properties include density, refractive index, boiling point and melting point. Approximate functions relating these properties to structure are reported and correlations with observed data are shown graphically and extreme aberrations are discussed. The sources of all data are listed in an extensive bibliography.

S. Katz

Centrifugal Sedimentation

Robison, H. E. and Martin, S. W. BEAKER-TYPE CENTRIFUGAL SEDIMENTATION OF SUBSIEVE SOLID-LIQUID DISPERSIONS—I. *J. Phys. Colloid Chem.* **52**, 854-881 (1948) *May.*

This material formed part of the doctoral dissertation of the first named author when he was an Institute of Gas Technology Fellow. The theory of the determination of subsieve size distribution in solid particles by centrifugal sedimentation is excellently presented.

J. D. Parent

Fuel Technology

Gauger, A. W. PHYSICAL CHEMISTRY AND THE TECHNOLOGY OF FUELS. *Fuel* (British) **26**, 138-144 (1947) *September-October.*

The physical chemical approach to a number of problems in fuel technology is examined. Moisture in coal is discussed as a phenomenon involving "free" and "bound" water, the latter being considered as an adsorption phenomenon. Fischer-Tropsch synthesis is examined both from the standpoints of thermodynamics and reaction mechanisms. The water gas process is considered in a similar manner, and the problems involved in studying the mechanism of carbon combustion are described. The paper concludes with a brief discussion of ash clinker formation.

S. Katz

Vapor Phase Reactions

Spillane, L. J. and Goodwin, R. D. A LABORATORY APPARATUS FOR VAPOR PHASE REACTIONS. *J. Chem. Ed.* **25**, 78-80 (1948) *February.*

A simple all-glass laboratory apparatus for studying vapor phase reactions at atmospheric and reduced pressures is described. The description includes the feed system and vaporizer, the converter and the condensing and sampling system.

S. Katz

10. CHEMICAL ENGINEERING

Distillation Design

Harbert, W. D. ECONOMIC DISTILLATION DESIGN: A STUDY OF THE COMPARATIVE IMPORTANCE OF THE DISTILLATION VARIABLES. *Petroleum Refiner* **27**, 106-109 (1948) *April.*

The author discusses the three principal variables of an economic distillation design: 1) the separations obtained between the components in the overhead and bottoms product streams;

2) the heat effects of the condenser, reboiler and feed preheater and the resultant amounts of counter-current liquid and vapor streams; 3) the numbers of vapor-liquid contacts or plates. He finds that in cost of maintenance, design, and operation, the number of plates variable runs a poor third.

H. Dirksen

Fractional Distillation and Absorption

Edmister, W. C. HYDROCARBON ABSORPTION AND FRACTIONATION PROCESS DESIGN METHODS. *Petroleum Engr.* **19**, 128, 131-132, 134, 137-138 (1948) *April.*

This is a general discussion of the separation of multicomponent mixture by fractional distillation.

J. D. Parent

Heat Transfer

Johnson, H. A. PERIODIC HEAT TRANSFER AT THE INNER SURFACE OF A HOMOGENEOUS WALL. *Heating, Piping, Air Conditioning* **20**, 121-130 (1948) *May.*

The continuity equation ($dt/d\theta = a[d^2t/dx^2]$) is solved for the case of a homogeneous wall where the outside air temperature is given as a periodic function of time. The inside air temperature is assumed constant, and the outside air coefficient (h_0) and inside air coefficient (h_L) are assumed constant. The sol-air temperature is used in place of the outside air temperature. This approximation helps correct for the radiant energy exchange on the outside of the wall. The solution is presented in algebraic form. Integration constants used in the solution are presented in graphical form which reduces the time consuming calculations to a minimum. An illustrative example is included in the article.

R. E. Peck

High Vacuum Systems

Normand, C. E. DESIGN OF HIGH VACUUM SYSTEMS. *Ind. Eng. Chem.* **40**, 783-787 (1948) *May.*

Basic formulae for flow of gases at low pressures in pipes are presented. In vacuum work flow performance is expressed in terms of conductance which is the flow rate divided by the pressure difference. Molecular flow can be assumed when the product of the mean pressure and tube diameter is less than 220 micron-inches.

J. D. Parent

Multi-Component Distillation

Scheibel, E. G. MULTI-COMPONENT DISTILLATION CALCULATIONS. *Petroleum Refiner* **27**, 92-105 (1948) *April.*

The author makes a thorough analysis of all the factors involved in the design of a column for multicomponent distillation. Simple methods for the determination of minimum reflux are described together with simple methods for evaluating the approximate number of plates required. The problem of heat balances around all the plates in the column to determine the variation of vapor and liquid is also

discussed and a new method for adapting the Ponchon method to multicomponent distillation is described.

H. Dirksen

Permeability

Ryder, H. M. PERMEABILITY ABSOLUTE, EFFECTIVE, MEASURED. *World Oil* **128**, 173-177 (1948) *May.*

Absolute permeability is thought to be dependent on structure only. Theoretically it is evaluated as Cd^n where C is a constant, d is a pore size term and n is a constant. n lies between 4.0 for a cylinder and 0.5 for openings between spherical grains. Permeability to a gas depends on a mean pressure and absolute permeability is obtained by extrapolating to infinite mean pressure.

J. D. Parent

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Air Compressor Installation

ENGINEERING AIR COMPRESSOR INSTALLATION. *Petroleum Engr.* **19**, 84, 86, 89, 90 (1948) *April.*

This discussion presented a general outline of factors to be considered when planning, selecting, and installing a compressor air plant. The compressor air plant was defined as the compressor, accessories, and distribution system. The most frequent indication of a need for increased compressor capacity was said to be low air pressure. This was discussed as to its causes, effects, and remedies.

B. E. Hunt

Carbosealing

Eaheart, A. E. MEMPHIS CARBOSEALING EXPERIENCE. *Gas Age* **101**, 22-23, 40, 43-44 (1948) *April* 15.

Shortly after natural gas was introduced into the Memphis distribution system, it was found that jute packing in the bell and spigot joints dried out. As a result the unaccounted-for-gas began to increase alarmingly. The mains were treated with Carboseal and the leakage dropped off about 65%. It was noted that if the joints had not been installed properly originally, leaking persisted after carboseal treatment, and leak clamps had to be used.

E. Strong

Controlled Volume Pump

Sheen, R. T. CONTROLLED VOLUME CHEMICAL PUMPS: DESIGN AND OPERATION. *Chem. Eng. Progress* **44**, 327-332 (1948) *April.*

The features of only the Milton Ray pump are described. The specific topics are pump characteristics, packing materials, and materials of construction. Flow sheets are presented showing how the proportioning pumps are applied

to automatic chemical feed systems by the use of the Thymotrol electronic circuit made by the General Electric Company. By providing cams which make the pistons travel at a constant speed, smooth non-pulsating delivery is claimed to be obtained by the Constametric pump.

W. J. Merwin

Flange Design

Lonngren, H. E. FLANGE DESIGN CONSIDERATIONS *Petroleum Refiner* 27, 69-73 (1948) *January.*

The author describes the main influencing factors affecting flange design. These are the minimum bolt load required by the kind of gasket used, its width, material, and the type of flange facing. Stress distribution in flange and hub are also considered. Some pronounced misconceptions in regards to design are discussed. A graphical method is presented for finding the stress distribution in a flange which has been strengthened by the addition of material to provide for anticipated metal loss through corrosion or erosion.

W. K. Zahray

Fractionator Design

Bray, L. PRACTICAL CONSIDERATIONS IN PROCESS DESIGN OF FRACTIONATORS. *Petroleum Refiner* 27, 115-122 (1948) *April.*

In fractionator design, initial investment, operation, and maintenance are the overall general considerations in designing for optimum conditions. In gathering information the process engineers has available not only data from handbooks, the literature, and his company's own laboratory, but also representatives of the operating, maintenance, and safety divisions, who should be consulted. The specific design features to be considered are: (1) materials of construction, (2) pressure and temperature, (3) number of trays, (4) tray spacing, (5) column height, (6) bubble tray openings, and (7) column openings.

C. L. Tsaros

High Pressure Gas Measurement

Ambrose, Z. C. HIGH PRESSURE GAS MEASUREMENT. *World Oil* 128, 188, 191-192 (1948) *May.*

A few of the problems experienced in high pressure gas measurement are discussed along with the methods of overcoming these problems. A choke installed downstream from a producing well meter insures the metering of a dry gas at full well pressure. The expansion occurs downstream so the meter installation remains warm which lessens freezing. Dampeners and chokes retard pulsations on meters in injection well lines. Proper design of pipe lines and the use of heaters eliminate hydrate formation.

E. Strong

Orifice Meters

Arant, J. B. ESTIMATING GATHERING SYSTEM METER RUN SIZES. *World Oil* 128, 206-207, 212 (1948) *May.*

Two graphs are given from which the size of the orifice meter and the meter run can be estimated when the pressure, volume, temperature,

and gravity of gas to be handled are known. Meter problems dealing with pressures from 1 to 10,000 psia and volumes from 100 to 100MM cu ft per day are readily handled with these graphs.

E. Strong

Orifice Meters

Nuneviller, E. D. and Considine, D. M. MAINTENANCE OF ORIFICE METERS. *Oil Gas J.* 46, 107-113 (1948) *April* 15.

Precautions to be taken in installing and general methods of trouble-shooting that can be used in the maintenance of orifice meters are given.

E. Strong

Pipe Line Maintenance

Stephens, D. K. ELECTRIC ARC WELDING AGAINST PRESSURE. *Petroleum Engr.* 19, 141-142, 145 (1948) *March.*

This article gives a thorough review of methods of maintenance of pipe line while the lines are under pressure.

O. Bloomer

Process Control

Arant, J. B. BASIC PRINCIPLES IN PROCESS CONTROL. *Petroleum Refiner* 27, 96-99 (1948) *February.*

Some of the basic principles in process control are discussed in a generalized manner. The author's main point is, however, the necessity for all chemical and process engineers to have an understanding of the basic principles in process control. Addition of a course in process instrumentation to the chemical engineering curriculum is recommended.

O. Bloomer

Process Control Instruments

Lee, E. S. NEW PROCESS CONTROL INSTRUMENTS FOR CHEMICAL INDUSTRY. *Chem. Eng. Progress* 44, 263-268 (1948) *April.*

New process control instruments such as mass spectrometer type—analytical mass spectrometer, process control spectrometer, and leak detector—thermal gas analyzer, X-ray photometer, fault detector, and recording spectrophotometer are discussed. The basic principles of design, method of operation, and applications of these instruments are discussed in a general way.

B. E. Hunt

12. MATERIALS OF CONSTRUCTION

Corrosion Protection

Seagren, G. W. ORGANIC COATINGS FOR CORROSION PROTECTION—A GENERAL DISCUSSION. *Corrosion* 4, 219-226 (1948) *May.*

Prerequisites for an organic coating which

can be used as a protection against corrosive agents upon metals are: it must be continuous over the whole area, impermeable to the corrosive agent, resistant to deterioration and to the spreading of corrosion from the uncoated area which has already been subjected to attack. The author gives examples of a specific type of coating used for a given type of corrosion, and stresses the necessity of having a thorough knowledge of the whole field of organic coatings as well as the nature of corrosion to be combatted before attempting to choose a protective coating. There is no organic coating that is impermeable to the corrosive agent above temperatures of 600°F, but the most effective at these temperatures are the silicones.

S. Mori

Heat Resistant Alloys

Grant, N. J., Frederickson, A. F. and Taylor, M. E. A SUMMARY OF HEAT RESISTANT ALLOYS FROM 1200° TO 1800°F. PART I. *Iron Age* **161**, 73-78 (1948) *March* 18; PART II—*ibid.* 75-81 (1948) *April* 8; PART III—*ibid.* 84-93 (1948) *April* 15.

Properties of 53 high temperature alloys are correlated and evaluated. The alloys are classified into groups and compositions, density, coefficient of expansion, and tensile properties are tabulated. Particular attention is devoted to stress rupture data and creep properties at various temperatures. Factors that influence rupture and creep properties are discussed and a graphical study indicating the comparative potentialities of many alloys at various temperature levels is presented.

O. Bloomer

Refractory Oxides

INTRODUCTION TO STUDY OF THE REFRACTORY OXIDES. *Industrial Heating* **15**, 300, 302 (1948) *February.*

The refractoriness of several oxides which offer possibilities for refractory use, as well as methods of determining this property are discussed. The author concludes that only magnesia, alumina, and chrome offer possibilities at present.

O. Bloomer

13. NEW BOOKS

Gaseous Fuels

Shnidman, L. GASEOUS FUELS. New York, American Gas Association, 1948.

The author discusses the recent developments and problems of the industry and provides a comprehensive study of the properties, behavior and utilization of fuel gases. Current subjects such as the design of atmospheric gas burners, interchangeability of fuel gases, controlled furnace atmospheres and gas holder purging practices are discussed in detail. Sketches, graphs and data are used throughout the text to simplify explanations. References to more detailed information are given at the end of each chapter.

E. F. Davis

Heat Pump

Sporn, P., Ambrose, E. R. and Baumeister, T. HEAT PUMPS. New York, John Wiley & Sons, Inc., 1947.

The subject is treated by a successive consideration of the thermodynamic principles; equipment design, specification and selection; maintenance, operating, economic and installation problems. No attempt is made to analyze the theory, performance and design of the various pieces of equipment that make up a heat pump. Only those aspects of the performance and design of these equipments are considered which will assist in the development and assembly of a good heat pump installation. References are given for each subject discussed.

E. F. Davis

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Corrosion
Corrosion and Material Protection
Engineers' Digest
Fuel Abstracts
Fuel in Science and Practice
Gas
Gas Age
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Gas Appliance Merchandising
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Industrial Heating
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Instruments
Iron Age
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LP Gas
Materials and Methods
Mechanical Engineering
Metals Technology
Mining and Metallurgy
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Transactions American Society of Mechanical Engineers
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World Oil